

Remarks

The present amendment replies to the Official Action mailed May 9, 2003. That action rejected claims 36-50 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 28 and 36-50 were rejected under 35 U.S.C. 102(b) as being anticipated by Spence et al. U.S. Patent No. 3,167,395 ("Spence"). Claims 51-55 were withdrawn from consideration. Claims 29 and 30 were allowed. These grounds for rejection are addressed below following a brief discussion of the present invention to provide context.

Claims 51-55 have been canceled, with claims 1-27 and 31-35 having been previously canceled. Claims 28-30 and 36-50 are pending, with claims 29 and 30 standing allowed.

The Present Invention

One commonly used technique for the control of discharge while reducing the need for complex valve systems is a U-valve arrangement. It is advantageous to provide a U-shaped tube, commonly referred to as a U-valve, at a bottom port of a vessel, in order to prevent the self discharge of liquid from an open bottom port of the vessel. Under ordinary circumstances, the U-shaped tube allows the liquid from the vessel to enter the tube to a level which does not exceed the level of the liquid in the vessel. This arrangement allows the convenient maintenance of equilibrium of liquid level in the vessel, without requiring that a valve at the bottom of the vessel remain closed. It is possible, however, to use such a U-shaped tube to discharge liquid from the vessel by applying a negative pressure to the tube. It is also possible to use the U-shaped tube to purge the vessel by directed gas under positive pressure from the output end of the tube.

A U-valve works reliably with large tubing inner dimensions (IDs), and under room temperature conditions; however, a U-valve based on small ID tubing and operated with

sufficiently hot liquids may cause undesired discharge of the contents of a vessel through the U-shaped tubing. This occurs because of increased pressure inside the vessel and the origination of gas bubbles in the fluid under higher temperature conditions. The formation of gas bubbles can cause the level of liquid in the vessel to rise above the level of liquid in the U-shaped tube, resulting in a siphoning effect, which can cause a complete discharge of the liquid from the vessel. Smaller ID tubing may exhibit capillary action, which increases the likelihood of siphoning.

A U-valve apparatus according to one aspect of the present invention includes a flow interruption device included in a U-valve. The flow interruption device includes a sealed chamber with an inlet tube and an outlet tube. A liquid flows into the chamber at the inlet until the level of liquid in the chamber reaches the level of liquid in the vessel. Because of the interruption of the liquid flow provided by the flow interruption device, the likelihood of siphoning from the vessel through the U-valve is greatly reduced. It is possible, however, to deliberately evacuate the vessel by exerting a negative pressure on the U-valve, creating a negative pressure and tending to draw liquid out of the chamber through the outlet.

The Section 112 Rejections

The Official Action rejected claims 36-50 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Official Action stated that "[t]he claims appear to be in a form in which process steps of how the device is used is being claimed. The claims should be amended to clearly recite the structural limitations of the elements of the invention." This rejection leaves Applicant somewhat confused. These claims recite both an element and the function performed by that element. Clearly, a claim may include functional language. See

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MPEP 2173.05(g) which reads: "A functional limitation is an attempt to define something by what it does, rather than by what it is.... There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. In re Swinehart, 439 F.2d 210, 169 USPQ 226 (CCPA 1971)."

See claim 37, for example, which clearly recites that "the flow-interruption device prevents siphoning of the liquid." This claim recites a structural element and a function performed by that element. As stated by the MPEP at Section 2173.05(g), "[a] functional limitation is often used in association with an element...to define a particular capability or purpose that is served by the recited element." Reconsideration and withdrawal of this ground of rejection is respectfully requested. Alternatively, clarification of the ground of rejection and a chance to discuss it with the Examiner by telephone are requested.

The Art Rejections

Claims 28 and 36-50 were rejected under 35 U.S.C. 102(b) as being anticipated by Spence. These rejections are respectfully traversed as not supported by the relied upon art. As addressed by the Federal Circuit, anticipation under Section 102 can be found only if a reference shows exactly what is claimed. Titanium Metals Corp. v. Banner, 227 U.S.P.Q. 773 (Fed. Cir. 1985). Spence does not anticipate and does not render obvious the claims, as addressed in greater detail below.

As an initial matter, clarification is requested regarding the status of claims 41-50. As claims 41-45 depend directly from allowed claim 29 and claims 46-50 depend directly from allowed claim 30, claims 41-50 should be allowable with their parent claims. They also address their own unique features which support their patentability when these features are properly considered in combination.

Turning to the relied upon art, Spence is entitled "Resonating Pulse Reactor". Spence describes a continuous tubular reactor "for carrying out polymerization reactions requiring agitation...and other operations requiring agitation of mixtures passing through the reactor...." Col. 1, lines 10-15. The tubular reactor comprises delivery conduit G which delivers an inert gas to gas domes A and B which are used as potential energy storage devices. A pulse generating device P operates with the gas domes A and B "to oscillate the progressively flowing liquid stream at a frequency corresponding to the resonance frequency of the system...." Col. 2, lines 38-45.

In contrast to Spence, the present invention provides a flow-interrupting U-valve device for connection to a discharge port of a vessel for preventing inadvertent liquid flow from the vessel through the U-valve. See claim 28, for example, which includes: "a flow-interruption device within the U-valve, the flow-interruption device comprising: a sealed chamber; an inlet connected to a portion of the U-valve connected to the discharge port of the vessel, the inlet allowing entry of liquid into the chamber; and an outlet connected to a section of the U-valve adapted to allow discharge of the liquid, the outlet being separate from the inlet in order to interrupt flow of liquid entering the chamber from flow of liquid exiting the chamber." The Official Action states that "the gas dome B [is] the equivalent of the flow interruption device with a sealed chamber with an inlet and an outlet." Applicant respectfully disagrees. The gas dome B is not equivalent to the claimed flow-interruption device of the present invention. Claim 28 clearly recites that the flow-interruption device includes a sealed chamber and the outlet is separate from the inlet to interrupt the flow of liquid entering the sealed chamber from the flow of liquid exiting the sealed chamber. As described above, the gas dome B is merely a potential energy storage device.

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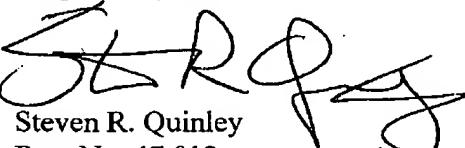
See also claim 37, for example, which recites that the "flow interruption device allows purging of the vessel utilizing negative pressure." Such a limitation is not taught and is not rendered obvious by Spence.

In summary, nothing in the relied upon reference indicates a recognition of the problems of preventing inadvertent self discharge of a liquid from a vessel addressed by the present invention. Further, nothing in the relied upon reference teaches or suggests technique which would solve the problems addressed by the present invention in the advantageous manner in which they are solved by the present invention. The claims of the present invention are not taught, are not inherent, and are not obvious in light of the art relied upon.

Conclusion

In closing, all of the claims appearing to be in order for allowance, prompt allowance of the claims is requested. Any questions regarding this application may be raised by telephone with the undersigned if it is considered that processing of this application will be expedited thereby.

Respectfully submitted,



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